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ABSTRACT

This guide is intended to assist vocational educators teaching a course in textiles to relate the skills addressed in science courses to a particular vocational education course. The guide consists of a curriculum alignment chart that cross-references vocational performance indicators to science skills/competencies. The science competency indicators presented for each vocational education performance indicator are broken down according to science course and grade level. Selected teacher helps in the form of student exercises are also provided for each performance indicator listed in the curriculum alignment chart. (MN)

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
001 01. List principal natural fibers.	001 Identify types of textile stock.	ELEMENTARY SCIENCE Grades 4-6 (Matter and Energy)
02. List principal man-made fibers.		2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials
03. Identify the origins of the principal fibers.	SKILLS: Identify - plants classification function parts animals List - plants animals biochemistry compounds Describe - matter properties Give - properties Draw - machines Calculate - power/work	3.01 Describe properties such as color, shape, weight, and texture of given objects

001

INSTRUCTIONS TO STUDENTS: Obtain a small piece of absorbent cotton. This provides the fibers. Arrange the fibers in a narrow row. Holding the row of fibers at each end, twist it only two or three times.

1. By doing the above, what have you made? Yarn

INSTRUCTIONS TO STUDENTS: In the item(s) below you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A common man-made fiber used in fabric construction is:
 - A. Cotton.
 - B. Jute.
 - ☒ C. Polyester.
2. The most common natural fiber used in textile manufacturing is:
 - ☒ A. Cotton.
 - B. Silk.
 - C. Wool.
3. The most common hair of animals used in textile manufacturing is:
 - A. Alpaca.
 - B. Silk.
 - ☒ C. Wool.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A name given to rayon by the early textile manufacturers was:
 - A. Artificial dacron.
 - ☒ B. Artificial silk.
 - C. Artificial wool.
2. Orlon is to acrylic as dacron is to:
 - A. Olefin.
 - B. Saran.
 - ☒ C. Polyester.
3. Dacron is to rayon as cotton is to:
 - ☒ A. Wool.
 - B. Orlon.
 - C. Kodel.

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
002 01. List the major dyes and the fiber groups with which they are used.	002 Identify types of textile dyes and chemicals.	PHYSICAL SCIENCE Grades 8-12 (Inorganic Chemistry) 8.01 List basic characteristics of acids, bases, and salts, and give examples of each group
02. Distinguish the difference between dyeing methods.	SKILLS: List - salts bases acids organic compounds compounds biochemistry	(Organic Chemistry) 1.01 List examples of common organic compounds
03. Identify the different finishing methods.	Identify - acids bases salts compounds formulas hydrocarbons Recognize - organic alcohol groups Sketch - isomers/compounds compounds/hydrocarbons organic acids compounds Build - isomers/compounds compounds/hydrocarbons organic acids alcohols/compounds	CHEMISTRY Grades 10-12 (Acids, Bases, and Salts) 1.01 Identify ways each of a list of common acids, bases, and salts may be used either in the home or in industry (Organic Chemistry) 1.01 Build and sketch as many isomers as possible for each formula when given a set of balls and stick components and several simple molecular formulas of carbon compounds 2.01 Build and sketch the simplest members of the alkanes, alkenes, alkynes, and ring compounds that comprise the hydrocarbons, using a model building set 3.01 Identify, name, and use various substitution (functional) groups to produce formulas of common hydrocarbon derivatives 3.02 Sketch, build (using models), and recognize the composition of several functional groups such as simple organic acids, alcohols, aldehydes, ketones, ethers, acetates, vinyls, and phenols

002

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Printing fabrics is a textile process accomplished by:

☐ A. Transfer of starch.
☒ B. Transfer of dye.
☐ C. Transfer of size.

2. The application of color to cloth is known as:

☐ A. Staging.
☐ B. Sizing.
☒ C. Dyeing.

3. The basic dyeing process is:

☒ A. Stock.
☐ B. Tint.
☐ C. Size.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. When a dye colors fabric directly with one application of immersion, the dye is said to be:

☐ A. Vat.
☒ B. Direct.
☐ C. Azoic.

2. The type of dye used primarily for animal fiber is:

☐ A. Basic.
☐ B. Mordant.
☒ C. Acid

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Top dyeing refers to the dyeing of:

☒ A. Wool.
☐ B. Cotton.
☐ C. Polyester.

2. The dyeing of textile fiber before it is spun is referred to as:

☒ A. Stock dyeing.
☐ B. Yarn dyeing.
☐ C. Piece dyeing.

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
008 01. Classify yarns by type.	008 Develop a glossary of yarn manufacturing terms, fabric manufacturing terms, and dyeing and finishing terms.	PHYSICAL SCIENCE Grades 8-12 (Inorganic Chemistry)
02. List and describe the basic yarn forming process for long and short staple systems.		4.01 Identify compounds, mixtures, and elements when given a list including some of all
03. List and describe the forms of continuous filament yarns.	SKILLS: Identify List Classify Define Explain	7.01 List correct symbols and/or formulas when given names of common elements and compounds
04. Define monofilament.		8.01 List basic characteristics of acids, bases, and salts, and give examples of each group
05. Define multifilament.		(Organic Chemistry)
		1.01 List examples of common organic compounds
		6.02 List ways plastics are important to our society
		CHEMISTRY
		Grades 10-12 (Matter--Composition and Changes)
		4.01 Recognize and explain selected chemical changes that occur during selected reactions
		(Atomic Theory)
		4.01 Classify samples of matter as elements, compounds, or mixtures
		(Chemical Reactions)
		3.01 Demonstrate and explain the effect that changes in temperature, concentration, and pressure have on the extent and direction of a chemical reaction

008

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A basic finishing process by which cotton fabric is treated with a caustic solution to achieve a lustrous finish like silk is:
 - A. Durable press.
 - B. Sanforizing.
 - ☒ C. Mercerizing.
2. To prevent shrinkage, fabric is:
 - ☒ A. Sanforized.
 - B. Mercerized.
 - C. Sheared.
3. Ring is to spinning as harness is to:
 - ☒ A. Weaving.
 - B. Knitting.
 - C. Finishing.

Natural Fibers

Animal
Vegetable
Mineral

Man-made Fibers

Cellulosic
Synthetic
Nonfibrous natural substances

Scouring

Bleaching

Dyeing

Classes of dyes
Methods of color
Application

Printing

Finishing

Physical
Chemical

Definition of Weaving

Yarn Preparation for Weaving:

1. Warping
2. Slashing
3. Drawing-in
4. Quilling

Weaving Motions

1. Principle
2. Auxiliary

Loom Types

1. Conventional
2. Shuttleless

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

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VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
010 01. Interpret a weave pattern (design).	010 Interpret work orders and requisitions.	ELEMENTARY SCIENCE Grades 4-6 (Introduction to Science) 1.01 Suggest ways of finding a solution(s) of a given science problem by using a scientific method
02. Interpret a knit pattern (design).		3.01 List ways that science is important to our economy
03. Interpret a nonconventional pattern (design).	SKILLS: Interpret Measure List Demonstrate	(Matter and Energy) 1.01 Make simple measurements in units of length, mass, and volume using the metric system units of measurement
04. Complete a requisition for parts from the supply room.		ELEMENTARY SCIENCE/ATTITUDES Grades 4-6 2.01 Express a realization that scientific knowledge is essential to the welfare of our society which is complex and dependent upon science 5.02 Demonstrate critical thinking and the use of scientific inquiry when given a scientific problem
		PHYSICAL SCIENCE Grades 8-12 (Introduction to Physical Science) 3.01 List major steps of a scientific method 3.02 Demonstrate the ability to apply a scientific method in solving an experimental problem
		PHYSICAL SCIENCE/ATTITUDES Grades 7-12 4.01 Enjoy the challenge of formulating theories to explain observations 4.03 Display enthusiasm for solving problems using experimental methods 5.01 Make interpretations of observations and data obtained from experiments

010

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Materials a production planner must become familiar with are:

- ☒ A. Loom schedules.
- ☐ B. Quality reports.
- ☐ C. Absentee reports.

2. Textile styling is usually determined by:

- ☐ A. Yarn costs.
- ☐ B. Cut and sew costs.
- ☒ C. Consumers.

3. The last textile process fabric goes through before it goes to the market place is:

- ☐ A. Printing.
- ☐ B. Dyeing.
- ☒ C. Finishing.

INSTRUCTIONS TO STUDENTS: Given an assignment to clean a circular knitting machine, which of the following supplies and tools might you need? Place a check in the blank to indicate the ones you need.

- | | |
|--|---|
| ☐ 1. Reed hook | ☒ 5. Wipe rag |
| ☒ 2. Brush | ☒ 6. Cleaning solvent |
| ☐ 3. Pick glass | ☒ 7. Rubber gloves |
| ☐ 4. Stop watch | ☒ 8. Bucket |

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE: Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
012 01. Compare English and metric system as to length and weight.	012 Use yarn reel and scales. SKILLS: Compare Measure Demonstrate	ELEMENTARY SCIENCE Grades 4-6 (Introduction to Science) 1.01 Suggest way of finding a solution(s) of a given science problem by using a scientific method (Matter and Energy) 1.01 Make simple measurements in units of length, mass, and volume using the metric system units of measurement 1.02 State two advantages of the metric system such as being based upon ten and easy conversion within a given aspect of measurement such as length (Measuring and Computing) 1.01 Mass objects and record the mass properly, within the precision of the equipment, using a balance PHYSICS Grades 10-12 (Matter and Energy) 1.01 Differentiate between mass and weight and explain various properties of matter (Measurement) 3.01 Use various measuring instruments in laboratory situations 4.01 Demonstrate accuracy and precision in computing and measuring when doing laboratory experiments 4.02 Select appropriate measuring instruments when working with measurement problems

012

INSTRUCTIONS TO STUDENTS: Determine method of coloring.

Unravel yarns from swatch provided. If the yarn is a solid color, the length of the yarn is usually _____.(1)

If the yarn has bundles of different colors or fibers of different color, it is _____.(2)

If dye penetration is complete after untwisting yarns, then the swatch is _____.(3)

TEACHER ANSWERS

INSTRUCTIONS TO STUDENTS: Determine weight of natural cotton yarn, dacron yarn and worsted yarn.

TEACHER ANSWERS

INSTRUCTIONS TO STUDENTS: Given eight quills of yarn, use the yarn reel and determine the average quill yardage. Write your answer in the space provided.

Average quill yardage: _____

TEACHER ANSWERS

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE: Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
016 01. Identify types of Textile Stock.	016 Use lab dyeing kits.	ELEMENTARY SCIENCE
02. Explain the different methods of dyeing and printing.	SKILLS: Identify	Grades 4-6 (Matter and Energy)
03. Perform laboratory dyeings.	Explain	2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials
04. List and describe the various classes of dyestuffs.	Demonstrate	3.01 Describe properties such as color, shape, weight, and texture of given objects
	List	5.01 Make and describe a solution from given ingredients (i.e., salt and water)
	Describe	16.01 Distinguish between mixtures and compounds
		LIFE SCIENCE/ATTITUDES
		Grades 7-12
		5.02 Demonstrate critical thinking and the use of scientific inquiry when given a scientific problem
		CHEMISTRY
		Grades 10-12 (The Science of Chemistry)
		2.01 Plan experiments (purpose and procedures), carry them out safely (follow conduct and safety rules), interpret results (think and consult reference books), and communicate the results (tables, graphs, precise language)
		(Matter--Composition and Changes)
		4.01 Recognize and explain selected chemical changes that occur during selected reactions
		(Chemical Reactions)
		2.01 Observe and explain the effects of temperature, surface area, catalysis, and other factors affecting reaction rates when given a laboratory situation

016

INSTRUCTIONS TO STUDENTS: Obtain some unbleached or bleached muslin and cut off a piece. Get some dye or use plain ink. Place the muslin in the dye. You are dyeing the cloth after it has been woven. Remove the swatch, let it dry.

NAME THIS METHOD OF DYEING. Piece dyeing

INSTRUCTIONS TO STUDENTS: Now, remove some yarns from muslin that has not yet been dyed. Place these yarns in the dye. In this case the yarns are being dyed. Remove the yarns and let them dry.

NAME THIS METHOD OF DYEING. Yarn dyeing

INSTRUCTIONS TO STUDENTS: Next, untwist some yarns from muslin and reduce them to fibers. Place them in the dye. Remove and dry them.

NAME THIS METHOD OF DYEING. Stock dyeing

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
017 01. Describe the difference between expendable and nonexpendable supplies.	017 List yarn manufacturing supplies, fabric manufacturing supplies, and dyeing and finishing supplies.	ELEMENTARY SCIENCE/MANIPULATIVE SKILLS Grades K-12 1.01 Demonstrate the proper use of a laboratory instrument appropriate for the student's grade level or course
02. Follow instruction in completing a supply requisition.	SKILLS: Describe List Demonstrate Classify	ELEMENTARY SCIENCE Grades 4-6 (Matter and Energy) 2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials 3.01 Describe properties such as color, shape, weight, and texture of given objects
		ELEMENTARY SCIENCE/ATTITUDES Grades 4-6 1.02 Display an open and analytical mind in examining and discussing issues which invite a variety of opinions
		LIFE SCIENCE/ATTITUDES Grades 7-12 5.02 Demonstrate critical thinking and the use of scientific inquiry when given a scientific problem
		LIFE SCIENCE/PROCESS SKILLS Grades 7-9 2.01 Classify a group of objects or concepts according to their various properties
		PHYSICAL SCIENCE Grades 8-12 (The Atom) 1.01 Describe properties of each state of matter and indicate how they are interrelated

VOCATIONAL EDUCATION COURSE Textiles

017

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A pick glass is used in textile design to:
 - A. Determine fabric strength.
 - B. Determine fabric price.
 - ☒ C. Determine fabric construction.
2. Supplies that a weaver must have on their job includes:
 - ☒ A. Reed hook.
 - B. Stop watch.
 - C. Tachometer.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Shuttles are equipment pieces used with:
 - ☒ A. Looms.
 - B. Slashers.
 - C. Combers.
2. The type of equipment to be found in a weave room will include:
 - ☒ A. Looms.
 - B. Quillers.
 - C. Twisters.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Flyers are component parts of:
 - A. Spinning frames.
 - B. Cloth frames.
 - ☒ C. Roving frames.
2. Component parts of a loom are:
 - A. Rings.
 - B. Travelers.
 - ☒ C. Heddles.

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VOCATIONAL EDUCATION COURSE Textiles
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VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
020 01. Define creeling. 02. Define warping. 03. Define slashing. 04. Describe the yarn preparation steps necessary before knitting.	020 Demonstrate skills in selected jobs pertaining to yarn preparation. SKILLS: Define Demonstrate Determine	ELEMENTARY SCIENCE Grades 4-6 (Matter and Energy) 2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials 3.01 Describe properties such as color, shape, weight, and texture of given objects PHYSICAL SCIENCE Grades 8-12 (Introduction to Science) 3.02 Demonstrate the ability to apply a scientific method in solving an experimental problem BIOLOGY Grades 10-12 (The Scientific Background) 1.02 Perform laboratory exercises according to scientific methods CHEMISTRY Grades 10-12 (Acids, Bases, and Salts) 3.01 Determine experimentally the pH, the effect on litmus paper, and other physical characteristics of acids, bases, and salts

VOCATIONAL EDUCATION COURSE Textiles

020

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. What is the name of the material that is applied to the yarn during the slashing operation?

☐ A. Dye.
☒ B. Size.
☐ C. Finish.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. What is the name of the process where yarn is transferred from packages to section beams?

☐ A. Creeling.
☒ B. Warping.
☐ C. Slashing.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. What is the name of the package on which the filling is wound to be used on the shuttle type loom?

☐ A. Cheese.
☒ B. Quill.
☐ C. Cone.

1. Describe the yarn preparation steps necessary before weaving.
2. List principle and auxiliary motions used during the weaving process and describe each in detail.
3. Discuss the three (3) conventional loom types, their uses and limitations in light of fabric design capabilities.
4. Analyze a swatch of woven fabric to determine requirements necessary to reproduce or duplicate a given sample.

Definition of Weaving

Yarn Preparation for Weaving:

1. Warping
2. Slashing
3. Drawing-In
4. Quilling

Weaving Motions

1. Principle
2. Auxiliary

Loom Types

1. Conventional
2. Shuttleless

Warp Knit

Definition
 General properties
 Basic mechanisms
 Knitting elements
 Needle beds

Knitting Action

Fabrics

Weft Knit

Definition
 General Properties
 Basic Mechanisms

Machine
 Knitting elements
 Needle beds and sinker rings
 Knitting action
 Fabrics

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS 023 01. Make a list of different types of textile machinery. 02. Explain the reason for periodic cleaning of textile machines. 03. Explain the importance of correct lubrication of textile machinery.	023 Demonstrate skills in maintenance and repair of textile machinery.	PHYSICAL SCIENCE Grades 8-12 (Mechanics) 3.01 Identify work and nonwork situations when given a list of examples 5.01 Calculate power when given a simple word problem 5.02 Demonstrate how the rate of work may vary in a given simple apparatus 6.01 Draw six simple machines 6.02 Demonstrate how simple machines do work 6.03 Calculate the mechanical advantage when given machine problems
	SKILLS: List Demonstrate Explain Identify Calculate	PHYSICAL SCIENCE/MANIPULATIVE SKILLS Grades K-12 1.01 Demonstrate the proper use of a laboratory instrument appropriate for the student's grade level or course 2.01 Demonstrate proper care of laboratory instruments when using and storing them 3.01 Construct simple equipment, models, and exhibits using materials and supplies appropriate for the student's grade level or course
		PHYSICS Grades 10-12 (Force and Motion) 1.01 Relate various force and motion problems to the correct laws PHYSICS Grades 10-12 (Work, Energy, and Power) 1.01 Distinguish between potential and kinetic energy 2.01 Trace the flow of energy (energy train) using a series of energy transfer problems 3.01 Solve for unknown variables using problems about work, energy.

INSTRUCTIONS TO STUDENTS: Explain the importance of correct lubrication of textile machinery. Write your answer in the space provided.

TEACHER ANSWERS

INSTRUCTIONS TO STUDENTS: Explain the reasons for periodic cleaning of textile machinery. Write your answer in the space provided.

TEACHER ANSWERS

1. List and describe all processes in sequence for converting raw fibers to finished yarn.
2. Demonstrate a knowledge of yarn processing machinery by identifying component parts and describing principles used for each specific operation.

Long Staple System

Scouring
Carding
Gilling
Converting
Combining (optional)
Drawing
Roving
Spinning
Winding
Twisting (ply)

Students: Listen to instructor's discussion of the following:*

1. Definition
2. Purpose
3. Machinery description
4. Processing function
5. End product characteristics and properties

* Note: Each of the above learning experiences should be applied to each of the content areas listed in the left column.

Students: Sketch and label the machinery in the worsted yarn processing system to show stock input, output, and major parts of the machinery and their direction of movement.

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
024 01. Make a list of different methods of producing a fabric. 02. Describe characters of selected cloth.	024 Analyze a woven swatch of fabric, a knitted swatch of fabric, and a tufted swatch of fabric.	ELEMENTARY SCIENCE Grades 4-6 (Introduction to Science) 1.01 Suggest ways of finding a solution(s) of a given science problem by using a scientific method (Matter and Energy) 2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials 3.01 Describe properties such as color, shape, weight, and texture of given objects ELEMENTARY SCIENCE/MANIPULATIVE SKILLS Grades K-12 3.01 Construct simple equipment, models, and exhibits using materials and supplies appropriate for the student's grade level or course LIFE SCIENCE/ATTITUDES Grades 7-12 4.01 Enjoy the challenge of formulating theories to explain observations 4.03 Display enthusiasm for solving problems using experimental methods 5.01 Make interpretations of observations and data obtained from experiments 5.02 Demonstrate critical thinking and the use of scientific inquiry when given a scientific problem LIFE SCIENCE/PROCESS SKILLS Grades 7-9 1.01 Identify the similarities and/or differences, using the senses, when given a collection or concepts 4.01 Record observed information from science experiences in simple, clear tabular form
	SKILLS: List Describe Identify	

024

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristics of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 1 --- Looks **TEACHER ANSWERS**

Feels _____ How made _____

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristics of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 2-- Looks **TEACHER ANSWERS**

Feels _____ How made _____

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristics of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 3 --- Looks **TEACHER ANSWERS**

Feels _____ How made _____

1. Identify the basic types of nonconventional fabrics.
2. Describe the principles of formation for each.
3. List typical end uses for each.

Nonconventional Fabrics

Tufting
Felting
Bonding
Needle Punch
Spun Bonding
Malimo
Flocking

Teacher: Discuss nonconventional fabrics to include the following:

1. Definition
2. Principles of formation
3. Uses

Students: View film.

Students: Construct chart showing types of nonconventional fabrics, their construction, and end uses.

Class: Examine sample of each type of nonconventional fabric and discuss their differences in hand.

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		ELEMENTARY SCIENCE
025 01. List the different items of equipment for testing textile yarns.	025 Demonstrate skills in physically testing textile yarns.	Grades 4-6 (Introduction to Science) 1.01 Suggest ways of finding a solution of a given science problem by using a scientific method
02. Describe the characteristics of the microscopic appearance of a wool fiber.	SKILLS: List Describe Demonstrate Identify	(Matter and Energy) 2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials
03. Describe the characteristic microscopic view of a cotton fiber.		3.01 Describe properties such as color, shape, weight, and texture of given objects 4.03 Classify a given substance according to its present state of matter
		ELEMENTARY SCIENCE/PROCESS SKILLS
		Grades 4-6
		1.01 Identify at least three properties common to the group when given a group of objects that are related
		2.01 Identify at least two properties of a given group of objects according to their properties
		2.02 Sort a given group of objects according to their properties
		4.01 Use words, drawings, or charts to transmit the information learned from a given science experience
		LIFE SCIENCE/PROCESS SKILLS
		Grades 7-9
		1.01 Identify the similarities and/or differences, using the senses, when given a collection of objects or concepts
		PHYSICS
		Grades 10-12 (Measurement)
		4.01 Demonstrate accuracy and precision in computing and measuring when doing laboratory experiments

VOCATIONAL EDUCATION COURSE Textiles

025

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. The fiber which would be classified as having the feel of wool in a filling twist is:

☐ A. Nylon.
☒ B. Acrylic.
☐ C. Acetate.

2. The fiber which would have an odor of burning paper in a burning test is:

☒ A. Cotton.
☐ B. Wool.
☐ C. Silk.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A trade name for polyester is:

☒ A. Dacron.
☐ B. Creslan.
☐ C. Orlon.

2. The majority of manmade fibers are derived from a:

☒ A. Polymer form.
☐ B. Monomer form.
☐ C. Oligomer form.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. A characteristic of the microscopic appearance of a wool fiber is:

☐ A. Lines running in the lengthwise direction.
☒ B. Scales along the outer layer.
☐ C. A round appearance.

2. The appearance of the microscopic view of a cotton fiber consists of:

☒ A. Ribbon-like filaments.
☐ B. Cylindrical filaments.
☐ C. A transparent tubular appearance.

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
Q26 01. Discuss distinguishing animal fiber from vegetable fiber.	026 Demonstrate skills in chemically testing textile yarns.	PHYSICAL SCIENCE Grades 8-12 (Inorganic Chemistry) 4.01 Identify compounds, mixtures, and elements when given a list including some of all 5.01 Write several examples of chemical reactions 8.01 List basic characteristics of acids, bases, and salts, and give examples of each group BIOLOGY Grades 10-12 (The Scientific Background) 1.02 Perform laboratory exercises according to scientific methods CHEMISTRY Grades 10-12 (The Science of Chemistry) 2.01 Plan experiments (purpose and procedure), carry them out safely (follow conduct and safety rules), interpret results (think and consult reference books), and communicate the results (tables, graphs, precise language) (Measuring and Computing) 1.01 Mass objects and record the mass properly, within the precision of the equipment, using a balance (Matter--Composition and Changes) 1.01 Classify samples of matter as: (1) solid, liquid, gas; (2) metallic, nonmetallic; (3) colored, colorless; (4) shiny, dull
02. Discuss the process for analyzing the fiber content of a fabric sample.	SKILLS: Discuss Demonstrate List Identify	

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Animal fibers can be distinguished from vegetable fiber by the use of a/an:

☒ A. Alkali solution.
☐ B. Salt solution.
☐ C. Alcohol solution.

2. When analyzing the fiber content of a fabric sample, the fibers should be:

☒ A. Left in the fabric state.
☐ B. In a loose form.
☐ C. Left in an untwisted form.

INSTRUCTIONS TO STUDENTS: In the item(s) below, you are given a situation and three possible answers. Select the best answer and place on your answer sheet.

1. Dacron to acetone is like cotton is to:

☒ A. Acid.
☐ B. Alkali.
☐ C. Alcohol.

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
027 01. Perform burn tests on selected natural fabric samples.	027 Demonstrate skills in physically testing textile fabrics.	Grades 4-6 (and Energy)
02. Perform burn tests on selected man-made fabric samples.	SKILLS: Demonstrate Classify Identify Define List	2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials 3.01 Describe properties such as color, shape, weight, and texture of given objects 4.03 Classify a given substance according to its present state of matter
		ELEMENTARY SCIENCE/MANIPULATIVE SKILLS Grades K-12 3.01 Construct simple equipment, models, and exhibits using materials and supplies appropriate for the student's grade level or course
		LIFE SCIENCE/PROCESS SKILLS Grades 7-9 1.01 Identify the similarities and/or differences, using the senses, when given a collection of object concepts
		PHYSICAL SCIENCE Grades 8-12 (inorganic Chemistry) 5.01 Write several examples of chemical reactions 9.01 Define chemical oxidation and reduction and illustrate the process using a simple reaction equation

027

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristic of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 1 --- Looks TEACHER ANSWERS
 Feels _____ How made _____

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristics of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 2-- Looks TEACHER ANSWERS
 Feels _____ How made _____

INSTRUCTIONS TO STUDENTS: Examine swatch supplied to you. On the lines below, write the characteristics of the piece of cloth. Tell how it looks, how it feels, and how it is made. A pick glass or magnifying glass will help you to make more detailed observations.

Swatch 3 --- Looks TEACHER ANSWERS
 Feels _____ How made _____

1. Identify and describe special finishing processes (including chemicals) and illustrate the principles involved.
2. Discuss the changes in fabric characteristics and properties brought about by the processing techniques and finishes.

Special Finishing Processes

Napping
 Sanforizing
 Calendering
 Grease Resistant & Durable Press
 Sizing
 Softening
 Flame Retardant & Flame Proofing
 Water Repellent & Water Proofing
 Decatizing
 Optical Brighteners
 Mercerizing

Students: Listen to instructor's discussion of the following:

1. Definition
2. Purpose
3. Machinery description
4. Mechanics and chemical processes
5. Product characteristics and properties

Nonconventional Fabrics

Tufting
 Felting
 Bonding
 Needle Punch
 Spun Bonding
 Melted
 Flocking

General Finishing Process

Singeing
 Desizing
 Scouring
 Bleaching
 Drying
 Finish Application
 Tentering

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
028 01. Identify and describe the general finishing processes.	028 Demonstrate skills in chemically testing textile fabrics.	PHYSICAL SCIENCE Grades 8-12 (Inorganic Chemistry)
02. Scour and bleach a sample of cotton or polyester/cotton fabrics.	SKILLS: Identify Demonstrate List Classify Describe	4.01 Identify compounds, mixtures, and elements when given a list including some of all 5.01 Write several examples of chemical reactions 8.01 List basic characteristics of acids, bases, and salts, and give examples of each group
		BIOLOGY Grades 10-12 (The Scientific Background) 1.02 Perform laboratory exercises according to scientific methods
		CHEMISTRY Grades 10-12 (The Science of Chemistry) 2.01 Plan experiments (purpose and procedure), carry them out safely (follow conduct and safety rules), interpret results (think and consult reference books), and communicate the results (tables, graphs, precise language) (Measuring and Computing) 1.01 Mass objects and record the mass properly, within the precision of the equipment, using a balance (Matter--Composition and Changes) 1.01 Classify samples of matter as: (1) solid, liquid, gas; (2) metallic, nonmetallic; (3) colored, colorless; (4) shiny, dull

028

INSTRUCTIONS TO STUDENTS: Obtain any piece of material and wash it. Make a starch solution. Dip the cloth into the starch, dry it until damp and then iron it.

TEACHER ANSWERS

INSTRUCTIONS TO STUDENTS: Take a piece of colored cloth. Cut the material in half and label "Unbleached Cloth." Using a bleaching agent, bleach the other half of the cloth by allowing it to remain in bleaching solution for at least 30 minutes. (It is suggested that you use more bleach than you would ordinarily use in washing.) Remove the piece of cloth from the bleach, dry it, and compare with half labeled "Unbleached."

How is the bleached cloth different?

TEACHER ANSWERS

General Finishing Process

Singeing
Desizing
Scouring
Bleaching
Drying
Finish Application
Tentering

Scouring

Subject a 6" x 6" sample of cotton or polyester/cotton fabric to a boiling solution of 2 tablespoons powdered detergent per quart of water for 1/2 hour.

Bleaching

Dip the dried sample into a 10% solution of Clorox at room temperature until saturation. Allow to dry for 2 hours and wash in same solution of 1 quart water to 2 tablespoons white vinegar to neutralize excess bleach.

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CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
030 01. Name 3 methods of making cloth. 02. Name the method of construction.	030 Describe the process involved in converting fiber to fabric. SKILLS: Describe Demonstrate Identify List Interpret Observe	ELEMENTARY SCIENCE Grades 4-6 (Matter and Energy) 2.01 Give characteristics of different kinds of matter such as wood, glass, metal, and cloth after a laboratory exercise dealing with a variety of materials 3.01 Describe properties such as color, shape, weight, and texture of given objects PHYSICAL SCIENCE Grades 8-12 (Introduction to Physical Science) 3.02 Demonstrate the ability to apply a scientific method in solving an experimental problem 4.01 Demonstrate a knowledge of the basic units of length, mass, volume, and temperature in the SI metric system when given measurement problems 4.02 Demonstrate an understanding of instrument sensitivity, parallax, and judgement errors which can result in inaccurate measurement when given a ruler and a measurement problem (Organic Chemistry) 4.01 Identify compounds, mixtures, and elements when given a list including some of all 4.02 List two ways compounds differ from mixtures PHYSICAL SCIENCE/ATTITUDES Grades 7-12 5.01 Make interpretations of observations and data obtained from experiments

1. List and compare the methods of spinning continuous filament yarns.
2. List and describe operations necessary after spinning to produce a continuous filament yarn ready for weaving or knitting.

Continuous Filament System

Methods of Extrusion - (spinning)

Melt Spun
Wet Spun
Dry Spun

Operations After Spinning

Drawing
Up-twisting
Down-twisting

Students: Listen to instructor's discussion of the following:

1. Definition
2. Purpose
3. Machinery description
4. Processing function
5. End product characteristics and properties.

Long Staple System

Scouring
Carding
Gilling
Converting
Combining (optional)
Drawing
Roving
Spinning
Winding
Twisting (ply)

INSTRUCTIONS TO STUDENTS: Obtain a small amount of absorbent cotton. Mix a solution of hot water and starch. Dip the absorbent cotton into the solution. Squeeze the excess solution from the cotton. Arrange the damp fibers into a thin sheet and press with a hot iron. (Place a cloth between the cotton and the iron.)

What have you made?

INSTRUCTIONS TO STUDENTS: Name the three methods of making cloth.

CURRICULUM ALIGNMENT CHART

VOCATIONAL EDUCATION COURSE Textiles

VOCATIONAL EDUCATION PERFORMANCE INDICATOR	VOCATIONAL EDUCATIONAL COMPETENCY SCIENCE SKILL/CONCEPT	RELEVANT SCIENCE COMPETENCY INDICATORS
INDICATORS		
032 01. Use shading board. 02. Analyze a specification sheet. 03. Identify standard conditions in a laboratory. 04. Demonstrate the use of balances.	032 Use established quality control standards. SKILLS: Identify Demonstrate Interpret Measure	ELEMENTARY SCIENCE Grades 4-6 (Introduction to Science) 1.01 Suggest ways of finding a solution(s) of a given science problem by using a scientific method 3.01 List ways that science is important to our economy (Matter and Energy) 1.01 Make simple measurements in units of length, mass, and volume using the metric system units of measurement ELEMENTARY SCIENCE/ATTITUDES Grades 4-6 2.01 Express a realization that scientific knowledge is essential to the welfare of our society which is complex and dependent upon science 5.02 Demonstrate critical thinking and the use of scientific inquiry when given a scientific problem PHYSICAL SCIENCE Grades 8-12 (Introduction to Physical Science) 3.01 List major steps of a scientific method 3.02 Demonstrate the ability to apply a scientific method in solving an experimental problem PHYSICAL SCIENCE/ATTITUDES Grades 7-12 4.01 Enjoy the challenge of formulating theories to explain observations 4.03 Display enthusiasm for solving problems using experimental methods 5.01 Make interpretations of observations and data obtained from experiments

Fabric System Calculations**Texture**

Warp and filling count
Course and wale count

Weight

oz/yd. (linear)
oz/yd.²
yd/lb.

Contraction

Lengthwise direction
Widthwise direction

Production rates

yards/machine
yards/minute
yards/hour
yards/day
yards/week

1. Illustrate a knowledge of yarn system calculations to include draft, weight and numbering systems, twist, and production rates at each operation in the yarn making process.
2. Discuss the relative difference in production rates of machinery used in the yarn forming system.

Yarn System Calculations**Draft**

Actual
Mechanical

Weight and Numbering Systems

Lap
Sliver
Roving
Yarn

Twist

Roving
Spinning

Production Rates

Carding
Drawing
Combing
Roving
Spinning
Winding
Twisting

Students: Measure and weigh a section of sliver. Process the sample through the drawing operation, then measure and weigh the sample to determine the draft. Perform the same operation on the roving and spinning frames.

Students: Measure and weigh a sample of yarn and calculate the resultant yarn number.

Students: Determine direction of twist and turns per inch of sample yarn.

Students: List and compare typical production rates of machinery used in the yarn forming system.

INSTRUCTIONS TO STUDENTS: In Column A below is a list of defects in textile stock. From the causes in Column B select the one which is most correct for each defect and mark on the answer sheet.

Column A

1. Oil
2. Mixed Stock
3. Waste

B
A
D

Column B

- A. Cotton and Wool
- B. Machinery and Equipment
- C. Tint and Dye
- D. Sweeps and Threads